

A. COVER SHEET

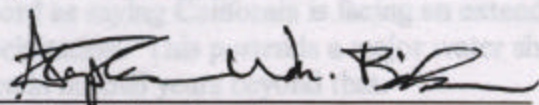
1. Specify: Urban Project
2. Proposal title: A Greywater Reclamation Project.
3. Principal applicant: ReWater Systems, Inc.
4. Contact: Stephen Wm. Bilson, CEO
5. Mailing address: 477 Marina Parkway Chula Vista, CA 91910
6. Phone: (619) 585-1196
7. Fax: (619) 585-1919
8. E-mail: stevebilson@earthlink.com
9. Funds requested: \$363,600
10. Applicant cost share funds pledged: \$2,535,000 (combination of other grants, vouchers, SRF loans, in-kind contributions)
11. Duration: 6/2001 - 6/2003
12. State Assembly and Senate and Congressional Districts: 79th Assembly District, 40th Senate District, 50th Congressional District.
13. Location and Geographic boundaries of project: San Diego County in the City of Chula Vista, southwest of rural community Jamul, 2 miles north of the US-Mexican border, abutting the eastern Chula Vista city limits and generally State Route 94 to the east.

Name and signature of official representing applicant. By signing below, the applicant declares the following:

- the truthfulness of all representations in the proposal;
- the individual signing the form is authorized to submit the application on behalf of the applicant;
- the applicant will comply with contract terms and conditions identified in Section 11 of this PSP

Stephen Wm. Bilson

Date: February 14, 2001



Signature of Applicant

All federal, state, and local water supplies and all of their urban, agricultural, and environmental constituencies will be impacted by this water shortage. This project would provide critical data on a potentially significant method of water conservation that has been in use for generations, has been legal since 1994 and utilized to a relatively small degree since then, but which has never been implemented on a community-wide scale - residential graywater recycling.

With less than 10" of annual rain in normal years, in drought years, when other water users exercise their senior water rights, San Diego in particular becomes critically short of water. Due to the Colorado River accord which requires California to decrease its historic overuse of the Colorado River, other rapidly growing Southern California areas such as Riverside and San Bernardino will be in

B. Scope of Work

Relevance and Importance

1. Executive Summary

This is a project to determine the water conservation and thus wastewater reduction values of residential greywater recycling irrigation systems in Southern California under normal use in 650 homes scattered around a city during all seasons. The SWRCB, San Diego County Water Authority (SDCWA), Otay Water District, and City of Chula Vista are in various stages of committing to providing funds to purchase and install greywater irrigation systems in various new residential developments encompassing the full socio-economic range of homeowners in a city; some have firm commitments. Funds from this application would be used to purchase and install monitors on those systems, to do the monitoring, and to report on the findings. The project's objective is to quantify the amount of water saved by greywater recycling irrigation systems in a real community.

2. Statement of Critical Issues

According to the US Census Bureau, California's population has grown 11% since the last drought. Per the Construction Industry Research Board, an independent research firm located in Burbank, over 105,000 single-family homes were built in California last year alone, with over 50,000 of those homes in Southern California. The San Diego area imports up to 100% of its water, with a significant portion coming from the Bay Delta area. The San Diego Association of Governments predicts that 421,000 new homes will be built over the next 20 years to accommodate 1,000,000 more people. According to DWR, California continues to receive the same amount of water it always has, in the same wet/dry cyclic patterns it always has. The National Ocean and Atmospheric Administration is on record as saying California is facing an extended period of below-normal precipitation. This portends a major water shortage crisis in the coming years and even in normal years beyond that.

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the same situation in the coming drought. This will geometrically compound the state's water supply problems in general and the Bay-Delta area in particular.

As is the case for most of Southern California, about half of San Diego area homes' water goes to landscape irrigation. Efficient irrigation methods should be a high priority for any conservation effort. Existing studies and agency water use estimates indicate that 50% of all water used in a home exits as greywater. A 1996 AWWA study found that the average national greywater production was about 39 gallons per day per person. The state greywater code recommends using 40 gpdpp, which equals about 128 gallons per day per home with 3.2 people in it, which is about 46,720 gallons per year, or .14 acre-feet per year. Over a 20-year life of a system, this is about 2.86 acre-feet of reused water.

Further, existing studies and agency analysis indicates that the subsurface irrigation method mandated by California's greywater irrigation code results in an additional savings of 30%, as compared to spray irrigation, which is what the vast majority of homes would utilize if not for a greywater system. Combining 50% reuse with a 30% efficiency increase amounts to about 3.7 acre-feet per home saved over the life of a greywater system. Actualizing such savings would be entirely consistent with all federal, state, region, and local water management plans.

3. Nature, Scope, and Objectives of Project

This project will purchase, install, and monitor greywater irrigation systems in 650 new homes that are owned by normal people from all walks of life. These homes will be located on lots ranging in size from about 4,000 square feet to about 8,000 square feet, in soils ranging from marginally percolating expansive to moderately percolating sandy clay. Landscape designs and plant selection will be constrained only by imagination. Agency involvement will be limited to visually monitoring the systems on a monthly basis, reading meters that register the volumes of water actually recycled and used for irrigation by those systems, recording any major problems, gathering weather data for that same time period, and writing reports on the findings.

Under the existing/funded plan as indicated in Chula Vista's application to the SWRCB SRF program, the project will monitor upstream and downstream sewer flows and compare them to a parallel sewer line from a similar but non-greywater-irrigated development on the other side of the canyon; this approach provides a macro view of events. Ideally, due to differences in homeowner bathing and laundry habits, landscape choices, landscape maintenance practices, and other factors possibly effecting the flows from their systems, each system would be monitored individually.

Because a California-legal greywater irrigation distribution system is capped at 20 psi, and that pressure is necessary for consistent irrigation, if an accurate flow measurement is to be taken, low-pressure meters must be utilized to keep the monitoring process from changing irrigation characteristics. In-line paddle wheel

sensors that are read by electronic meters have been determined to be the only type of measuring device that will not detrimentally obstruct the flow of greywater in this type of system. They are accurate, but add significant cost to the system. Funds under this grant will go towards paying for the metering devices, their installation on the system, their monthly reading, and quarterly and annual reporting, and a final report.

Technical/Scientific Merit, Feasibility, Monitoring, and Assessment

4. Methods, procedures, and facilities. Installation of the flow sensors will be done by the plumbing contractor hired to do the system installation. That contractor will install an in-line paddle-wheel flow sensor downstream of the filter so it measures only greywater going to irrigation. That sensor has a three-wire lead that will be connected to the reading device, or meter. This meter will be in a locked cabinet. The meter can not be deleted or reprogrammed, and it is stored in non-volatile memory so is not subject to power failures or surges.

Another contractor will be hired to do the meter monitoring and write the reports. The monitoring procedure to be followed will be to travel by car to the developments with systems, walk to each home, unlock the greywater meter, read the meter, and record it on a laptop computer spread sheet designed for this program. After all readings are recorded, the reader will then return to their office, duplicate the readings on a disk, secure the laptop, and store the disk separately. Quarterly, these readings will be cross referenced to rainfall data from DWR's local CIMIS station and compiled in a report. A report will be written annually.

The collective volumes of water that are reused will be recorded on a graph annually for two years and compared to rainfall and temperatures for those same periods in a final report. The final report will show a graph of actual month-to-month water savings, cross-referenced to precipitation and temperature graphs for those same months. These findings can then be extrapolated out to reflect savings for Southern California and thus decreased impacts to the Bay Delta and other water-exporting areas.

5. A single-page schedule of work tasks is attached.

6. After all readings are recorded, the reader will duplicate the readings on a disk, secure the field laptop, and store the disk separately. When the annual reports are written, participating agencies will be given a copy.

C. Outreach, Community Involvement, and Information Transfer

1. Outreach Efforts. The City of Chula Vista has a population of about 170,000, and a minority population of about 100,000. Chula Vista is located in the southern end of the San Diego bay area, where middle to low income housing is the norm. Low income housing is usually the least able to afford cost-saving features such as greywater irrigation systems. Under this program though, all

systems will be provided at no virtually cost to the builder. All developers and builders in this area have been contacted about participating in this program. Most have expressed interest in participating. For their homes to be plumbed and wired correctly, there must be a high degree of cooperation. There are no Indian tribes within the program boundaries.

2. Training, Employment, Capacity building. Most of the work will be performed by independent contractors. Monitoring and report writing will take about 1,500 hours. Plumbers will separate the greywater, provide tank venting, and install a Reverse Pressure Device on the freshwater connection during regular plumbing of the home. Electricians will provide an electricity source at the spot for the system controller during their normal wiring of the house. Landscapers will install the irrigation system during installation of the landscape. A local manufacturer of greywater systems has estimated it will take trained personnel 8 hours of plumbing, 2 hours of electrical, and 24 hours of landscaping work to install a complete system. Each home will then have the capacity to recycle over half the water from inside that home - about 46,000 gallons per year, even in droughts - and then reuse that water about 30% more efficiently than in spray irrigation systems.

3. Disseminating Project Information. All participating agencies will receive all reports as they become available. Additional entities that will be sent information are the AWWA and the CUWCC. Additionally, the news media will be kept apprised of this project and will be educated about the significance of the findings.

4. Letters of Intent to participate. Attached is a copy of Chula Vista's application the SWRCB's SRF program with its various letters of intent to participate.

D. Qualifications of the Applicants, Cooperators, and Establishment of Partnerships.

1. Resume of Project Manager. Attached is the resume of Stephen Wm. Bilson, Chief Executive Officer, ReWater Systems, Inc.

2. External Cooperators. Whichever manufacturer of greywater systems is ultimately selected will be a cooperator in this project. They will provide needed expertise in the installation, operation, and maintenance of their systems. Builders are extremely sensitive to installing new products on their homes in this litigious society, thus builders will be cooperators in that sense.

3. Partnerships. During the years-long SRF process, Chula Vista has held numerous meetings and had numerous conversations with many people from many agencies. Almost all of those agencies have committed to support this project in one manner or another. They are partners in that sense.

E. Cost and Benefits

1. Summary. This summarizes the portion of the project that this application seeks to be funded. An extremely thorough discussion of the costs and benefits of the entire project are found in the attached SRF loan and grant application.

- a. Salaries and Wages - Paid for out of existing Program
- b. Fringe Benefits- Paid for out of existing Program
- c. Supplies - Paid for out of existing Program
- d. Equipment - (sensors/wire/Schedule 80 pipe) \$260,000
- e. Services and Consultants - (monitoring, quarterly, annual, and final reports by third party) \$102,800
- f. Travel - Paid for out of existing Program
- g. Other Direct Costs - Paid for out of existing Program
- h. Total Estimated Costs - \$363,600

2. Budget Justification. The City of Chula Vista will have only a supervising role in the monitoring and reporting of the project. Costs for the City have already been included in the SRF application. These \$363,600 costs are estimates based on the sensor manufacturer's statement of equipment costs, on ReWater's estimates of meter read times at local developments; it includes the cost of a laptop computer and software. The City has also estimated the time it would take to create the reports needed, with all other salaries and wages, travel, supplies, etc., included in the consultant's costs.

3. Benefit Summary. Details of the benefits are shown in minute detail in the City's SRF application, and are summarized here as -

a. Quantified Outcomes.

Water

Water recycled annually - 93 acre-feet (AF)

Water saved though efficient irrigation - 28 AF

Annual water conserved via greywater irrigation - 121 AF

**Total water conserved over the 20-year life of the systems -
2,420 AF**

Water Values

Value to users of annual conserved water in present dollars -
\$95,413

**Value to users of conserved water over 20 years in 2001 dollars
- \$1,908,268**

Wastewater

Wastewater reduced - 93 acre-feet

Non-Point Source pollutants (run-off) reduced - unquantified

Wastewater Values

Wastewater Flow annually - \$31,257

Suspended Solids annually - \$1,176

Chemical Oxygen demand annually - \$2,989

Annual Combined Wastewater Value - \$35,422

Total Wastewater value of 20-year life of systems in 2001 dollars - \$708,440

The Construction Industry Research Board, an independent research company located in Burbank, reports that of the 105,000 new single-family homes built last year in California, just over 50,000 were built in Southern California. The CIRB predicts that about that many homes will be built in the coming year.

If the state's economy thus home-building remains about constant over the next 20 years, we can extrapolate the above savings to all the residences built in Southern California to be about 9,308 AF of water conserved the first year, with that much more being conserved each consecutive year. In the 20th year of building homes that use their greywater, 186,154 AF of water would be conserved that year alone.

Southern California receives at least 25% and up to 50% of its water from Northern California, all of which passes through the Bay Delta. 25% of 186,154 AF is 46,538 AF; 50% is 93,076 AF.

b. An unquantifiable favorable outcome of irrigating subsurface is the amount of irrigation run-off that will no longer carry animal feces and fertilizers into the local rivers and ocean waters, causing unwanted algae growth and other environmental consequences. This type of run-off is recognized by EPA and the SWQCB as having a deleterious effect on Southern California. They are attempting to address this issue in their Non-Point Source pollution prevention programs.

4. Assessment of Costs and Benefits.

a. Assumptions. This project assumes that the vast literature on greywater production and the inherent irrigation efficiencies of subsurface irrigation are generally correct. Specifically, that greywater is over the half the water used in a home (for example, City of Los Angeles Graywater Pilot Program, 1991-1992), and that subsurface drip irrigation is at least 25% more efficient than spray irrigation (for example, C.R.Camp, USDA, 1998.)

b. Benefits/Costs Value. The attached SRF application expresses the benefits and costs of this entire project in 1999 dollars and this application expresses them in current published prices, that is, in 2001 dollars.

c. Discount rate of 6%. The attached SRF application uses the SWRCB's standard discount rate of 6% to determine the benefits and costs of this project. What we learned from going through the SRF process is that

discounting this particular project from day-one provides an inaccurate analysis because the entire project is not capitalized on day-one. Rather, these systems are installed incrementally over two-years, thus all the money is not spent up-front and therefore should not be discounted like traditional projects where the money is spent up-front. The difference in interest expense, and thus cost-effectiveness of the project, is significantly different when the discount is applied only when the monies are actually spent.

d. Present Value. The attached SRF application shows the benefits and costs in present day values as well. While it does not break them down according to the Bay Delta's benefit, it can be assumed that because the San Diego area receives 25% - 50% of its water from the Bay Delta, that 25-50% of the benefits go to the Bay Delta.

B5 Schedule of Tasks

**Flow Sensors (\$325 each)
Installation (\$75 each)**

Sub Total - \$450 each

Monthly Flow Readings (by quarter)
Write Quarterly Report
Write Final Report

Total

Marketing address: 477 Marine Parkway Chula Vista, CA 91910

	\$1.	Air (6)
	\$1.00	\$26.406
		\$6.093
		\$32.1

Location and Geographic boundaries of parcel	2nd Qtr (9/01)	3rd Qtr (9/01)
Assembly District, 40 th Senate District, 50 th Congressional District	\$26,406.25	\$26,406.25
County in the City of Chula Vista, southwest of railroad tracks, 2 miles north of the US-Mexican border, abutting the eastern City limits and generally State Route 94 to the east.	\$6,093.75	\$6,093.75
	\$32,500	\$32,500
	\$2,350	\$2,350
	\$1,000	\$1,000

12/01)	3,525
06.25	1,000
93.75	
2,500	

- the truthfulness of all representations in the prospectus

the individual signing the form is authorized	\$	\$3	26,4	Our
	\$	\$6,0		

(3/0	\$4.77
106.1	\$1.00
093.1	
32.5	

02)	25	75	00	00	00
- the applicant will comply with contract					

\$ 5th
Deposited in Section 11 of this PSP

\$363,600